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METHOD FOR QUANTITATIVE CHEMICAL ANALYSIS OF BINARY MIXTURE OF MANILA AND SISAL FIBRES

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Indian Standard

METHOD FOR QUANTITATIVE CHEMICAL ANALYSIS OF BINARY MIXTURE OF MANILA AND SISAL FIBRES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 12 June 1964, after the draft finalized by the Textile Chemistry Sectional Committee had been approved by the Textile Division Council.

0.2 Two or more different types of fibres are mixed with one another for producing a variety of textiles; such a mixture may be composed of different types of man-made fibres or different types of natural fibres or both. The composition of mixture of textile fibres is governed by the ultimate use to which the textile materials are to be put.

0.2.1 Mixtures of textile fibres are being increasingly used for different purposes. The use of the different fibres in textile mixture has necessitated the formulation of standard methods for identification and quantitative estimation of fibres in mixtures. For the textile technologists as well as the trader and the consumer, the quantitative analysis of textile fibres in mixture is of considerable importance.

0.3 At present, binary mixtures are very widely used. This standard prescribes a method for the quantitative chemical analysis of binary mixture of manila and sisal fibres. Separate standards are being formulated for other types of mixtures.

0.4 Wherever a reference to any Indian Standard appears in this standard, it shall be taken as a reference to the latest version of the standard.

0.5 Metric system has been adopted in India and all quantities in this standard have been expressed in this system.

0.6 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*).

1. SCOPE

1.1 This standard prescribes a method for the quantitative chemical analysis of binary mixture of manila and sisal fibres in any form, such as fibre, yarn, rope or fabric.

NOTE — Before conducting an analysis according to this method, the fibres present in the mixture should be identified (*see* *IS : 667-1955 Simple Methods for Identification of Common Commercial Textile Fibres) and the sample to be analysed should be free from all added and non-fibrous matter.

2. PRINCIPLE

2.1 A sample of the mixture is dried and weighed. The sample is treated with calcium hypochlorite solution for 10 minutes. Bright colours are developed on fibres, deep orange on manila fibres and lemon yellow on sisal fibres. Using the difference in colour, the components are separated in wet condition and dried. The weight of manila component in the sample is determined and the proportion of manila fibres in the sample is calculated.

3. SAMPLING

3.1 Sample for determining the percentage by weight of manila or sisal fibres in a lot of textile material which is a mixture of manila and sisal fibres shall be selected so as to be representative of the lot.

3.2 Sample drawn in compliance with an agreement between the buyer and the seller to evaluate the percentage by weight of manila or sisal fibres in a textile material which is a mixture of manila and sisal fibres shall be held to be representative of the lot.

4. ATMOSPHERIC CONDITIONS

4.1 The test shall be conducted in ordinary room conditions.

NOTE — Since dry weights are determined, it is not necessary to condition the sample.

5. PREPARATION OF TEST SPECIMEN

5.1 If the sample under analysis is yarn or fibres, draw from the different portions of the test sample 3 or 4 tufts, each weighing about one gram. Cut the yarn or fibres so obtained into small pieces of 10 to 15 mm in length and mix them well. Draw at least three test specimens, each weighing about 0·5 g.

5.2 If the sample under analysis is rope or fabric, cut out from the different portions of the test sample 3 or 4 pieces each weighing about one gram. Dissect these pieces into yarn and cut the yarn so obtained into small pieces of 10 to 15 mm in length and mix them well. Draw at least three test specimens, each weighing about 0·5 g.

6. APPARATUS

6.1 Beakers — of 250 ml capacity.

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*Under revision.

6.2 Ventilated Oven — for drying samples at approximately 105° to 110°C.

6.3 Conical Flask — of 250 ml capacity, fitted with cold finger condenser.

6.4 Soxhlet Apparatus

7. REAGENTS

7.0 Quality of Reagents — Unless specified otherwise, pure chemicals shall be employed in tests and distilled water [*see* IS : 1070-1960 Specification for Water, Distilled Quality (*Revised*)] shall be used where the use of water or distilled water as a reagent is intended.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the experimental results.

7.1 Calcium Hypochlorite Solution — containing 3·5 g of available chlorine per litre.

7.2 Nitric Acid — 5 percent (*w*/*v*).

7.3 Ethyl Alcohol

8. PROCEDURE

8.1 Take one test specimen drawn as in **5.1** or **5.2**. Extract the test specimen with ethyl alcohol or any other suitable solvent in Soxhlet apparatus to remove all oily matter present (*see* Note). Put the extracted test specimen in a beaker and boil it with water for 30 minutes. Remove the pieces of test specimen from the beaker and dry them at 105° to 110°C.

NOTE — Generally eight extractions are necessary to remove all the oily matter.

8.2 Take in a conical flask about 150 ml of nitric acid and heat it to boil. Put all the dried pieces into the conical flask and place immediately on the conical flask a cold finger condenser. Boil the contents of the flask exactly for two minutes. Remove the condenser and wash thoroughly the pieces with water till all the traces of acid are removed.

8.3 Divide the washed test specimen into two or three smaller parts. Put each part into 250-ml beakers and treat each part with calcium hypochlorite solution (*see* **7.1**) with the material to liquor ratio of about 1 : 100. Shake the contents of each beaker at intervals for 10 minutes. Decant the liquid after distinct bright colours are developed on fibres (*see* Note 1). Wash the fibres with distilled water. Separate the two components in each part in wet condition. Mix all manila fibres and sisal fibres separately obtained from the different smaller parts. Dry the components separately at 105° to 110°C to constant weight (*see* Note 2) and weigh them accurately.

NOTE 1 — After the treatment deep orange and lemon yellow colours are developed on manila and sisal fibres respectively.

NOTE 2 — While drying, the components are checked for complete separation.

8.4 Calculate the percentage, by weight, of manila fibre in the test specimen by the formula given below:

$$\text{Percentage, by weight, of manila fibres in the test specimen} = \frac{W_1}{W_1 + W_2} \times 100$$

where

W_1 = oven dry weight of manila fibres, and
W_2 = oven dry weight of sisal fibres.

NOTE — The loss sustained in chemical treatments is practically same for both the manila and sisal fibres when the test specimen is treated as in **8.1** to **8.3**.

8.5 Repeat the procedure prescribed in **8.1** to **8.3** with the remaining test specimens. Calculate the percentage, by weight, of manila fibres in each case from the formula given in **8.4**.

8.6 Calculate the average of the values obtained in **8.4** and **8.5**.

9. REPORT

9.1 Report the average of the values as obtained in **8.6** as the percentage, by weight, of manila fibres in the lot.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 1 kg. 1 m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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